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A new species of the genus *Sphingius* (Araneae, Liocranidae) from China, and first description of the female: *Sphingius hainan* Zhang, Fu & Zhu, 2009

Feng Zhang†, Jian-Ying Fu‡

College of Life Sciences, Hebei University, Baoding Hebei 071002, China

† *urn:lsid:zoobank.org:author:904C4445-AAEA-40BC-B418-502053EF39B8*
‡ *urn:lsid:zoobank.org:author:BDAD3208-7E23-4682-B0CA-7110B38ACD76*

Corresponding author: *Feng Zhang* (zhangfeng@hbu.edu.cn)

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Abstract

A new species of the genus *Sphingius* to the family Liocranidae from Hainan Province is described and illustrated under the name of *Sphingius deelemanae* **sp. n.** In this paper the female of *Sphingius hainan* Zhang, Fu & Zhu, 2009 is described for the first time.

Keywords

Spider, taxanomy, new species, China

Introduction

The spider family Liocranidae currently contains 30 genera and 173 species worldwide, according to Platnick (2010). The spider genus *Sphingius* Thorell, 1890 was described based on the type species, *Sphingius thecatus* Thorell, 1890, from Malaysia, and the type is known from the male only. The genus *Sphingius*, so far, includes 21 described species distributed only in Southeast Asia (Platnick 2010). The species is mainly found

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in Bangladesh, India, Thailand, Myanmar, Malaysia, Indonesia, Philippines, Vietnam, and Sri Lanka. Among these 21 species, 4 occur in China (Deeleman-Reinhold 2001,Tso et al. 2005, Zhang et al. 2009).

While examining the spider specimens collected in 2009 from Hainan Island, southern China, we found a few liocranid specimens. Among these we recognized one new species, *Sphingius deelemanae* sp. n., and we also first describe the female of *Sphingius hainan* Zhang, Fu & Zhu, 2009.

Materials and methods

All measurements given in the text are in millimeters. Carapace length was measured from the anterior face of the ocular area to the rear margin of the carapace medially, excluding the clypeus. Total length is the sum of carapace and abdomen length, regardless of the petiolus. The measurements of the legs are as follows: total length (femur + patella + tibia + metatarsus + tarsus). All specimens are preserved in 75% alcohol and were examined, drawn and measured under a Tech SMZ1500 stereomicroscope equipped with an Abbe drawing device. Epigyna were removed and cleared in 10% warm solution of potassium hydroxide (KOH), transferred to alcohol and temporarily mounted for drawing. Palpal organs were drawn in prolateral, ventral, and retrolateral view. Specimens examined in this paper are deposited in the Museum of Hebei University (MHBU), Baoding, China, unless indicated otherwise.

The following abbreviations are used in the text: AER, anterior eye row; ALE, anterior lateral eyes; ALS, anterior lateral spinneret; AME, anterior median eyes; AME–ALE, distance between AME and ALE; AME–AME, distance between AME; MOA, median ocular area; PER, posterior eye row; PLE, posterior lateral eyes; PLS, posterior lateral spinneret; PME, posterior median eyes; PME–PLE, distance between PME and PLE; PME–PME, distance between PME; PMS, posterior median spinneret.

Taxonomy

Sphingius Thorell, 1890

Sphingius Thorell 1890: 284; Gravely 1931: 269; Majumder and Tikader 1991: 147; Deeleman-Reinhold 2001: 488; Tso et al. 2005: 48; Zhang et al. 2009: 32.
Thamphilus Thorell 1895: 35.
Alaeho Barrion and Litsinger 1995: 170.
Scotophaeoides Schenkel 1963: 49.

Type species: *Sphingius thecatus* Thorell, 1890, by original designation.

Diagnosis and description: see Zhang et al. 2009.

***Sphingius deelemanae* sp. n.**
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Figs. 1–7

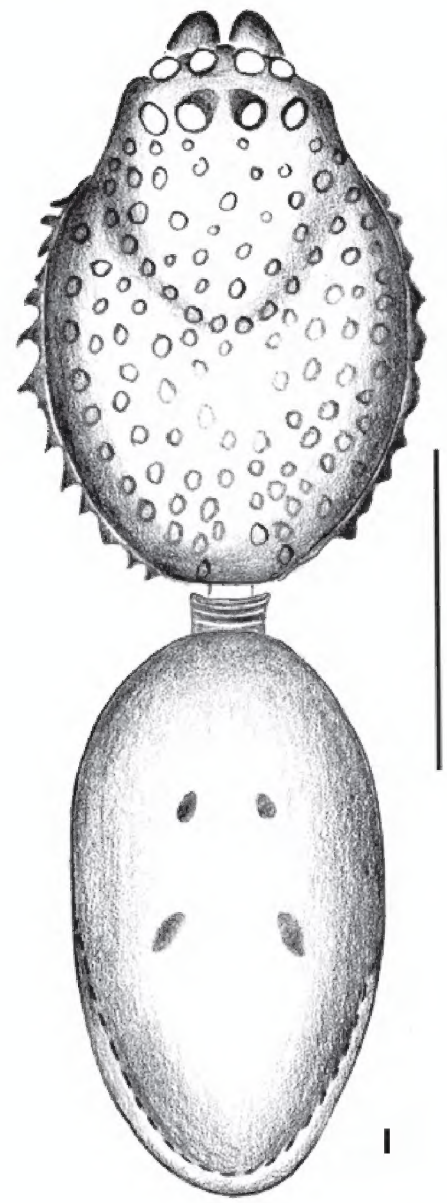
Type material. Holotype male, CHINA: Hainan Province, Mt. Jianfengling [N 18.62°, E 108.98°], May 28, 2009, G. X. Han leg. (MHBU), paratype 1♂, same data as holotype (MHBU).

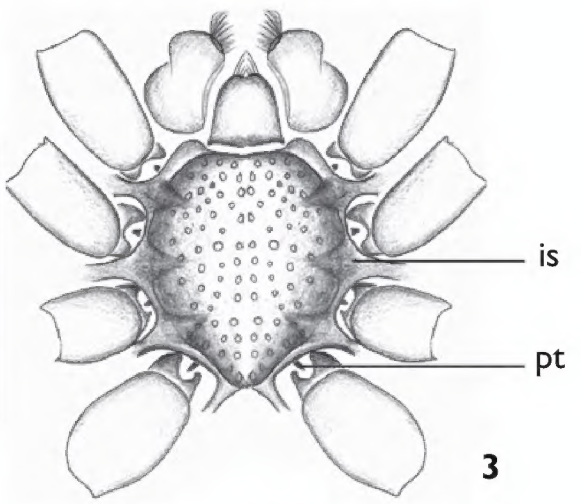
Diagnosis. In the Chinese *Sphingius* species, such as *S. hainan* Zhang, Fu & Zhu, 2009, *S. pingtung* Tso et al., 2005, *S. sinensis* (Schenkel, 1963) and *S. zhangi* Zhang, Fu & Zhu, 2009, the new species can be easily distinguished from *S. hainan* by its broader embolus (Fig. 5), while in *S. hainan* the embolus is shorter and thinner (Zhang et al. 2009: fig. 6); by the chelicerae without a distal anterior tubercle (Fig. 4), while *S. hainan* (Zhang et al. 2009: fig. 3) has such a distal anterior tubercle on the chelicerae. Specifically compared to *S. pingtung*, the new species is also distinguished the embolus broader and shorter (Fig.5), while in *S. pingtung* the embolus thinner and longer (Zhang et al. 2009: fig. 10); by the tibial apophysis shorter (Fig. 5), while in *S. pingtung* the tibial apophysis very long (Zhang et al. 2009: fig. 12). The new species can be distinguished from *S. zhangi* by having a longer and broader embolus and with the embolus tip very near to the distal end of the cymbium (Fig. 6), while in *S. zhangi* the embolus thinner, shorter and far from the distal end of the cymbium (Zhang et al. 2009: figs. 29, 31).

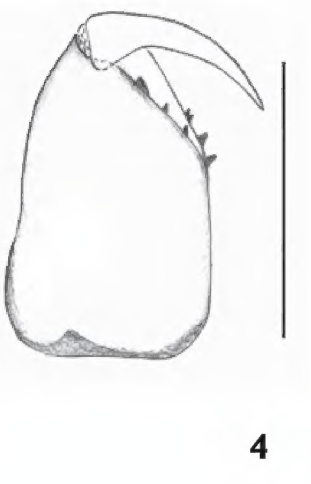
Comparing the new species with the seven species with known males found in nearby south east Asian countries, we find the new species can be distinguished from *S. scrobiculatus* (Myanmar), *S. songi* (Thailand) and *S. gothicus* (Thailand) by having a longer and broader embolus and the embolus tip very near to the distal end of the cymbium (Fig. 6), while in *S. scrobiculatus*, *S. songi* and *S. gothicus* the embolus thinner, shorter and far from the distal end of the cymbium (Deeleman-Reinhold 2001: figs. 840, 854, 844). The new species can be distinguished from *S. penicillus* (Thailand), *S. gracilis* (Myanmar) and *S. octomaculatus* (Myanmar) by the tibial apophysis shorter (Fig. 5), while in *S. penicillus*, *S. gracilis* and *S. octomaculatus* the tibial apophysis very long (Deeleman-Reinhold 2001: figs. 849, 839, 858). The new species can be distinguished from *S. punctatus* (Thailand, Indonesia) by the lump-shaped median apophysis (Fig. 5), while in *S. punctatus* the median apophysis ribbon-shaped (Deeleman-Reinhold 2001: fig. 864).

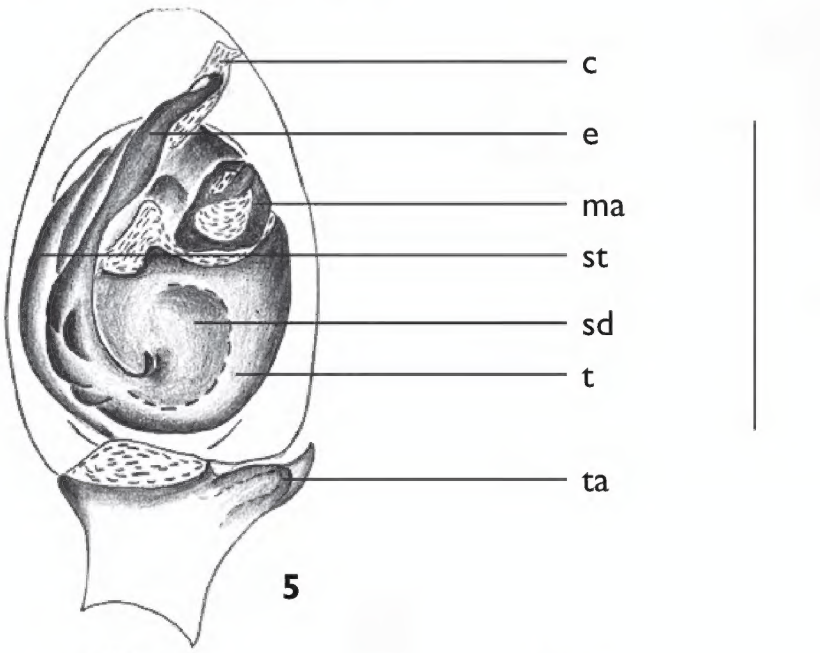
Etymology. The specific name is a patronym in honor of Dr. Christa L. Deeleman-Reinhold, arachnologist.

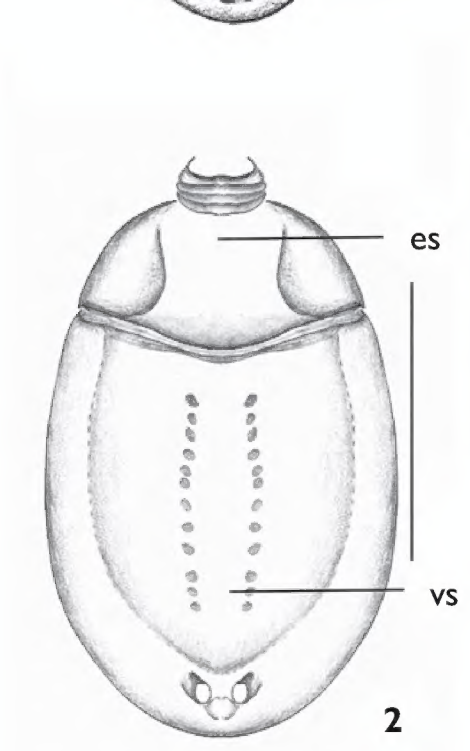
Description. Male (holotype). Total length 2.25: carapace 1.12 long, 0.85 wide; abdomen 1.13 long, 0.77 wide. Carapace ovoid in dorsal view (Fig. 1), with wedge-shaped posterior margin; reddish brown, surface covered with many seta-bearing granules, each sunk in a large round pit, lateral and posterior margins with triangular thorns, with a long seta arising from the side. Eyes in two transverse rows; AER slightly recurved and PER straight in dorsal view (Fig. 1). Eye diameters: AME 0.13, ALE 0.12, PME 0.14, PLE 0.13. Eye interdistances: AME–AME 0.17, AME–ALE 0.12,

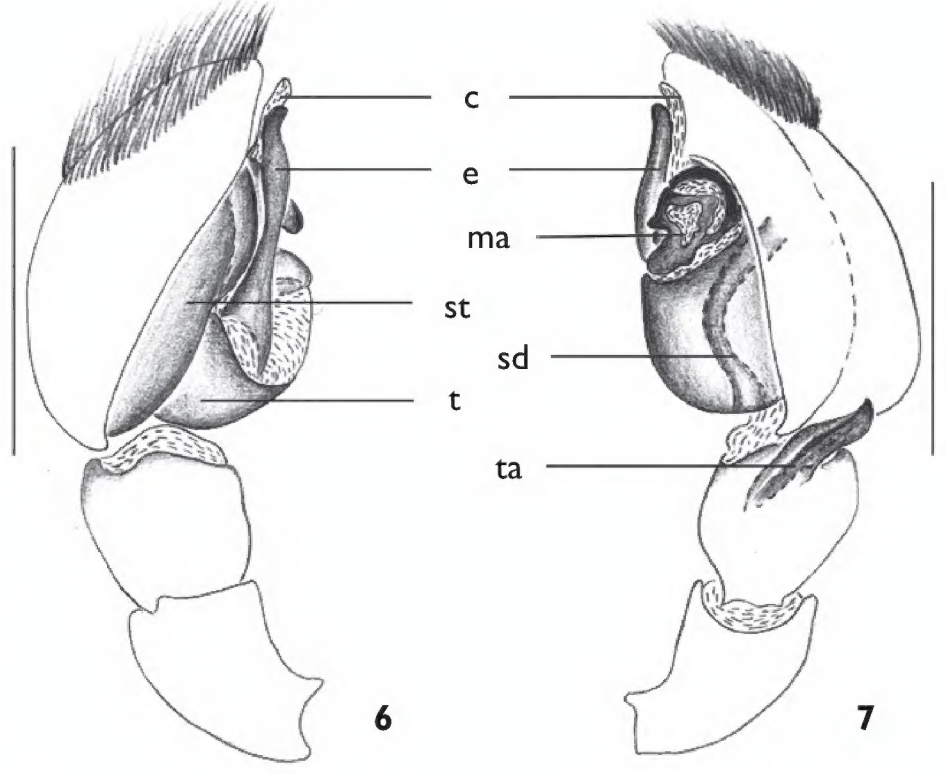












Figures 1–7. *Sphingius deelemanae* sp. n. **1** Male body, dorsal view **2** Male abdomen, ventral view **3** Endites, labium and sternum of male, ventral view **4** Male right chelicera, anterior view **5** Male left palp, ventral view **6** Same, prolateral view **7** Same, retrolateral view **c** conductor **e** embolus **es** epigastric scutum **is** intercoxal sclerites **ma** median apophysis **pt** precoxal triangles **sd** sperm duct **st** subtegulum **t** tegulum **ta** tibial apophysis **vs** ventral scutum. Scale bars: 1 mm (1–3); 0.4 mm (4–7).

PME–PME 0.16, PME–PLE 0.14; MOA 0.28 long, front width 0.26, back width 0.25. Thoracic groove obsolete. Chelicerae reddish brown (Fig. 4), with three promarginal and three retromarginal teeth, anterior surface somewhat swollen. Endites, labium and sternum dark brown (Fig. 3). Sternum shield-shaped, lateral margin with precoxal triangles and intercoxal sclerites. Space above the coxae and below the carapace with longitudinal, sclerotized pleural bars. Leg spination: femora I-IV with one small dorsal spine, tibia III v1-1-0, p0-0-1, metatarsus III v0-2-0; tibia IV v2-2-1, r0-0-1, metatarsus IV p0-1-0, v0-1-0, r0-1-0. Leg formula: 4123 (Table 1).

Abdomen (Fig. 1) dark brown dorsally, with nearly entire dorsal scutum, epigastric and postgenital scutum fused to some extent, postgenital scutum relatively large, about two thirds of abdomen length; venter smooth, without longitudinal lines.

Male palp as illustrated (Figs. 5–7). Tibia with short retrolateral apophysis. Bulb ovoid in ventral view (Fig. 5), tegulum straight at base; sperm duct distinctive U-shaped, originating from upper part of tegulum; subtegulum relatively large (Fig. 6); embolus bent, long and thick, originating from prolateral-apical tegulum, extending beyond tegulum (Fig. 5); conductor apical, corn-flake shaped; median apophysis nearly rectangular from retrolateral view, on distal-retrolateral sector of tegulum.

Distribution. Presently known only from the type locality, Mt. Jianfengling, Hainan, China.

***Sphingius hainan* Zhang, Fu & Zhu, 2009**
Figs. 8–13

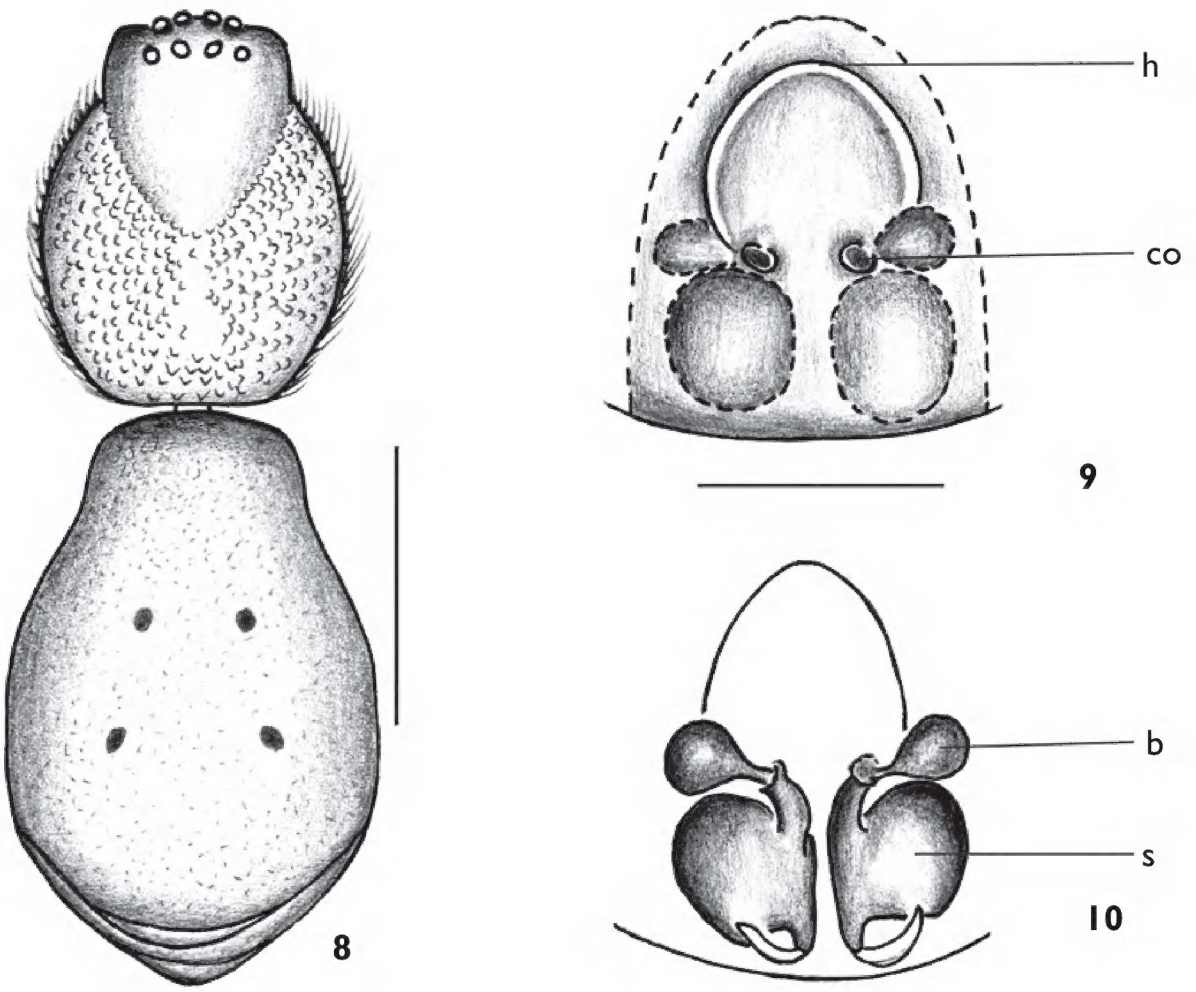
Sphingius hainan Zhang, Fu & Zhu, 2009: 34, f.1–8.

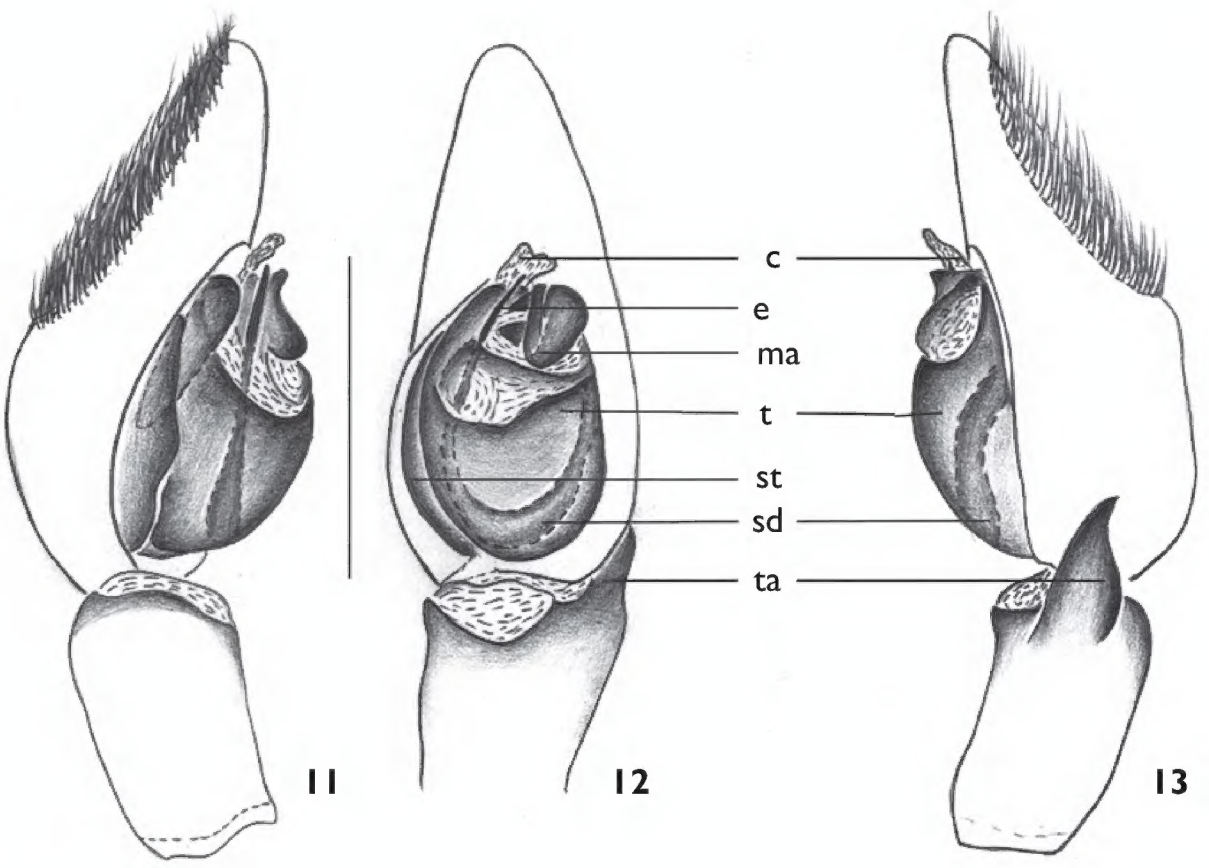
Material examined. 3♂2♀, CHINA: Hainan Province, Mt. Jianfengling [N 18.62°, E 108.98°], May 28, 2009, S. T. Guo and X. X. Zhang leg. (MHBU); 1♂ (holotype), CHINA: Hainan Province, Changjiang County, Mt. Bawangling, November 5, 2008, M. S. Zhu leg. (MHBU).

Diagnosis. In comparing Chinese *Sphingius* species, such as *S. sinensis* (Schenkel, 1963) and *S. zhangi* Zhang, Fu & Zhu, 2009, with the female of *S. hainan,* we find the epigyne *of S. hainan* has a large anterior hood (Fig. 9) while *S. sinensis* with two small anterior hoods (Zhang et al. 2009: fig. 18); and additionally, the epigynal hood of *S. hainan* is half-oval shaped (Fig. 9), while *S. zhangi* has a hood nearly rectangle-shaped (Zhang et al. 2009: fig. 27).

Table 1. Leg measurements of *Sphingius deelemanae* sp. n., male.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	1.13	0.54	0.86	0.59	0.54	3.66
II	0.86	0.45	0.72	0.54	0.50	3.07
III	0.59	0.40	0.54	0.70	0.67	2.90
IV	missing					





Figures 8–13. *Sphingius hainan* Zhang, Fu & Zhu, 2009. **8** Female body, dorsal view **9** Epigyne, ventral view **10** Vulva, dorsal view **11** Left male palp, prolateral view **12** Same, ventral view **13** Same, retrolateral. **b** bursa **c** conductor **co** copulatory opening **e** embolus **h** hood **ma** median apophysis **s** spermatheca **sd** sperm duct **st** subtegulum **t** tegulum **ta** tibial apophysis. Scale bars: 1 mm (8); 0.5 mm (9–13).

Comparing *S. hainan* with the seven *Sphingius* species with known females found in nearby south east Asian countries, *S. hainan* can be distinguished from *S. penicillus* (Thailand), by having a large anterior hood (Fig. 9) while *S. penicillus* with a small anterior hoods (Deeleman-Reinhold 2001: fig. 850). *S. hainan* is also very similar to *S. vivax* (Thorell, 1897) (Myanmar, Vietnam, Malaysia, Philippines) in the conformation of the male palpal organ, but can be distinguished from *S. vivax* by having a longer and thicker male palpal retrolateral tibial apophysis (Fig. 13), by the bulb with apical membranous conductor (Fig. 12), and by the shape of the median apophysis (Fig. 12). *S. hainan* can also be distinguished from *S. songi* (Thailand), *S. gothicus* (Thailand) and *S. punctatus* (Thailand, Indonesia), by having a half-oval shaped epigynal hood (Fig. 9) while epigynal hood M-shaped in *S. songi*, triangle-shaped in *S. gothicus*, and nearly rectangle-shaped in *S. punctatus* (Deeleman-Reinhold 2001: figs. 855, 845, 866). *S. hainan* can be distinguished from *S. octomaculatus* (Myanmar) and *S. gracilis* (Myanmar), by having a large anterior hood (Fig. 4) while the latter two without anterior hood (Deeleman-Reinhold 2001: figs. 861, 837).

Comparing *S. hainan* with the seven *Sphingius* species with known females found in nearby south east Asian countries, *S. hainan* can be distinguished from *S. penicillus* (Thailand), by having a large anterior hood (Fig. 9) while *S. penicillus* with a small anterior hood (Deeleman-Reinhold 2001: fig. 850). *S. hainan* can also be distinguished from *S. songi* (Thailand), *S. gothicus* (Thailand), *S. vivax* (Myanmar, Vietnam, Malaysia, Philippines) and *S. punctatus* (Thailand, Indonesia), by having a half-oval shaped epigynal hood (Fig. 9) while the epigynal hood rather 'M-shaped' in *S. songi* (Deeleman-Reinhold 2001: fig. 855), triangle-shaped in *S. gothicus* (Deeleman-Reinhold 2001: fig. 845), large and dome shaped in *S. vivax* (Deeleman-Reinhold 2001: fig. 842) and nearly rectangle-shaped in *S. punctatus* (Deeleman-Reinhold 2001: fig. 866). *S. hainan* can be distinguished from *S. octomaculatus* (Myanmar) and *S. gracilis* (Myanmar), by having a large anterior hood (Fig. 4) while the latter two without anterior hood (Deeleman-Reinhold 2001: figs. 861, 837).

Description. Female. Body length 5.00–5.53. One specimen was measured, total length 5.53: carapace 2.52 long, 2.07 wide; abdomen 3.01 long, 1.80 wide. Carapace ovoid in dorsal view (Fig. 8), deep reddish brown, with numerous small granulations, lateral and posterior margins with angular granulations. Eyes in two transverse rows; AER slightly recurved, PER straight or slightly recurved in dorsal view and longer than AER. Eye diameters: AME 0.13, ALE 0.12, PME 0.14, PLE 0.13. Eye interdistances: AME–AME 0.13, AME–ALE 0.19, PME–PME 0.50, PME–PLE 0.17; MOA 0.33 long, front width 0.29, back width 0.28. Chelicerae with three promarginal and two retromarginal teeth, anterior side with a tubercle. Endites brown, longer than wide, constricted at middle on lateral margin, anterior edge with clear serrula and scopula. Labium slightly rectangular, anterior margin with a slight concavity centrally. Sternum light brown, shield-shaped, covered with sparse granulations, posterior margin slightly extending between coxae IV, lateral margin with precoxal triangles and intercoxal sclerites. Space above the coxae and below the carapace with longitudinal, sclerotized pleural bars. Legs brown, anterior tibiae and metatarsi spineless, tarsi I–III almost as long as metatarsi. Leg spination: femora I-II with one small dorsal spines, tibia III v2-2-2, p 0-1-1, r 0-0-1; metatarsus III v 2-0-0; tibia IV v 1-1-1, p0-0-1, r 0-0-1, metatarsus IV p0-1-0, v 2-1-0, r 0-1-0. Leg formula: 4123 (Table 2).

Table 2. Leg measurements of *Sphingius hainan* Zhang, Fu & Zhu, 2009, female.

	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
I	1.75	0.98	1.47	1.09	1.08	6.37
II	1.73	0.92	1.42	1.06	1.01	3.14
III	1.32	0.52	1.06	0.92	0.87	4.69
IV	1.90	1.01	1.45	1.83	1.33	7.52

Abdomen ovoid (Fig. 8), dark brown, light brown centrally; dorsal scutum covering nearly all, and dorsum with one pair of muscular impression on middle part. Venter of abdomen yellow brown, epigastric scutum tripartite (to some degree, at least in the color) divided into a central plate and two lateral plates, postgenital scutum relatively small, about two thirds of abdomen length, venter with two rows of longitudinal lines of spots.

Epigyne as illustrated (Figs. 9–10). Epigynal plate oval-rectangular, anterior half concave and posterior half convex. Anterior atrial hood arch-shaped (Fig. 9). Copulatory openings situated in the corners of the depression, leading through funnel-shaped ducts to the spermathecae and bursae. Spermathecae posteriorly (Fig. 10), large, globose; bursae anteriorly, smaller globose, thin-walled; a short connecting tube between the anterior bursa and posterior spermatheca.

Male (holotype) . The male has been described by Zhang et al. (2009). Male palp as illustrated (Figs. 11–13).

Distribution. Hainan.

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